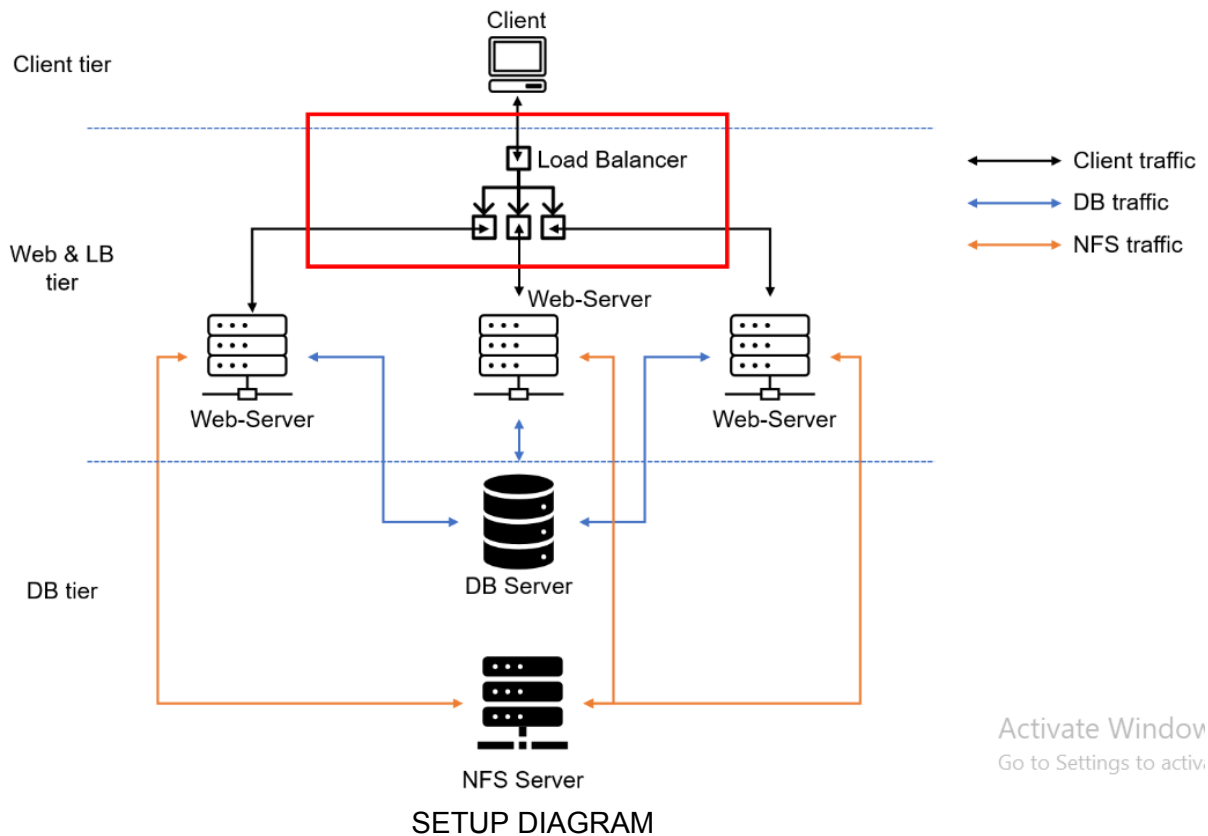


PROJECT 8 Latest

LOAD BALANCER SOLUTION WITH APACHE

3-tier Web Application Architecture with a single Database, an NFS Server as a shared files storage + Load Balancer



The concept in this project is to introduce a Load Balancer to distribute website traffic between the web servers and allow users to access the web site using a single URL.

- **Configure Apache As A Load Balancer**

<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public
<input type="checkbox"/>	Pro7Webserver2	i-063d1bcac2917d135	Running	t3.micro	2/2 checks passed	No alarms	eu-north-1b	ec2-1f
<input type="checkbox"/>	Pro7WebServer1	i-0f880dbd41afd8b21	Running	t3.micro	2/2 checks passed	No alarms	eu-north-1b	ec2-13
<input type="checkbox"/>	Pro7NFS-Server	i-00ba3bad502f4418f	Running	t3.micro	2/2 checks passed	No alarms	eu-north-1b	ec2-13
<input type="checkbox"/>	Pro7dbServer	i-07aebc42bf18319b2	Running	t3.micro	2/2 checks passed	No alarms	eu-north-1b	ec2-1f
<input type="checkbox"/>	Pro8Apache-LB	i-06cb7df56ffeb35d3	Running	t3.micro	2/2 checks passed	No alarms	eu-north-1b	ec2-13

- Open TCP port 80 on **Project-8-apache-lb** by creating an Inbound Rule in Security Group.

- Install Apache Load Balancer on `Project-8-apache-lb` server and configure it to point traffic coming to LB to both Web Servers:

```
#Install apache2
sudo apt update
sudo apt install apache2 -y
sudo apt-get install libxml2-dev
```

```
#Enable following modules:
sudo a2enmod rewrite
sudo a2enmod proxy
sudo a2enmod proxy_balancer
sudo a2enmod proxy_http
sudo a2enmod headers
sudo a2enmod lbmethod_bytraffic
```

```
#Restart apache2 service
sudo systemctl restart apache2
Make sure apache2 is up and running
sudo systemctl status apache2
```

2. Configuring Load Balancer

- Edit the `default.conf` file to add the backend web servers into the loadbalancers proxy for routing.

```
sudo vi /etc/apache2/sites-available/000-default.conf
#Add this configuration into this section <VirtualHost *:80> </VirtualHost>
```

```
<Proxy "balancer://mycluster">
    BalancerMember http://<WebServer1-Private-IP-Address>:80 loadfactor=5
    timeout=1
    BalancerMember http://<WebServer2-Private-IP-Address>:80 loadfactor=5
    timeout=1
    ProxySet lbmethod=bytraffic
    # ProxySet lbmethod=byrequests
</Proxy>
```

```
ProxyPreserveHost On
ProxyPass / balancer://mycluster/
ProxyPassReverse / balancer://mycluster/
```

```

<VirtualHost *:80>
    # The ServerName directive sets the request scheme, hostname and port that
    # the server uses to identify itself. This is used when creating
    # redirection URLs. In the context of virtual hosts, the ServerName
    # specifies what hostname must appear in the request's Host: header to
    # match this virtual host. For the default virtual host (this file) this
    # value is not decisive as it is used as a last resort host regardless.
    # However, you must set it for any further virtual host explicitly.
    #ServerName www.example.com
    <Proxy "balancer://mycluster">
        BalancerMember http://172.31.43.135:80 loadfactor=5 timeout=1
        BalancerMember http://172.31.41.43:80 loadfactor=5 timeout=1
        ProxySet lbmethod=bytraffic
        # ProxySet lbmethod=byrequests
    </Proxy>

    ProxyPreserveHost On
    ProxyPass / balancer://mycluster/
    ProxyPassReverse / balancer://mycluster/

    ServerAdmin webmaster@localhost
    DocumentRoot /var/www/html

    # Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
    # error, crit, alert, emerg.
    # It is also possible to configure the loglevel for particular
    # modules, e.g.
    #LogLevel info ssl:warn

    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined

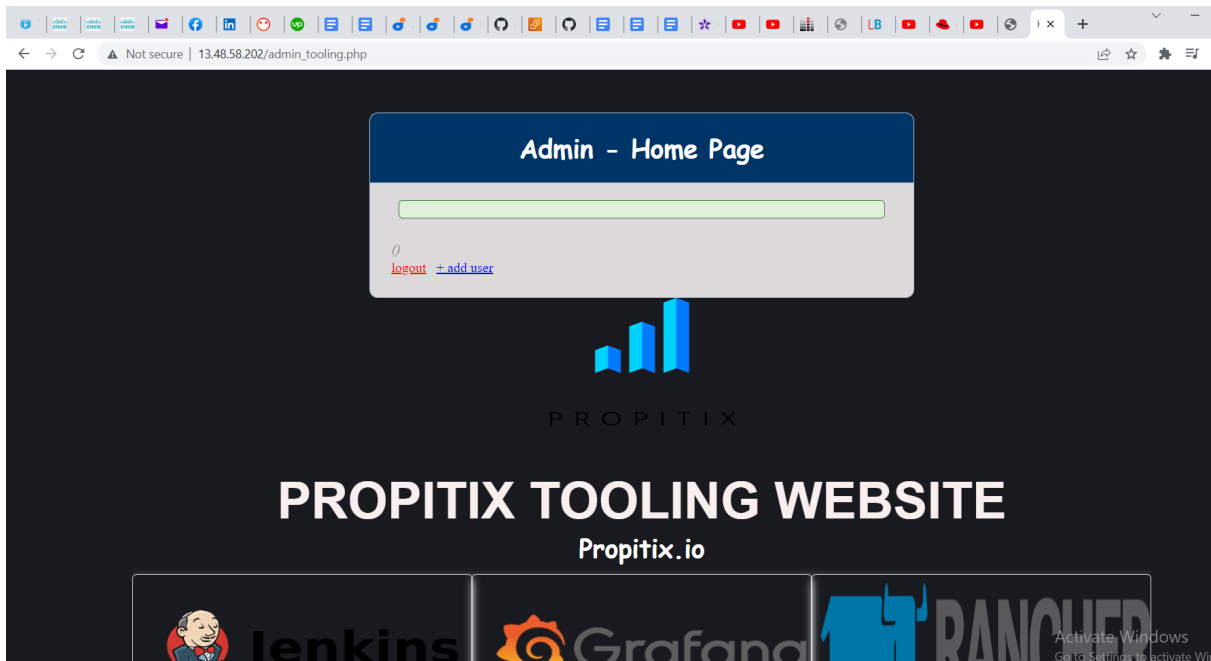
    # For most configuration files from conf-available/, which are
    # enabled or disabled at a global level, it is possible to
    # include a line for only one particular virtual host. For example the
    # following line enables the CGI configuration for this host only
    # after it has been globally disabled with "a2disconf".
    #Include conf-available/serve-cgi-bin.conf
</VirtualHost>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
-- INSERT --

```

- Restart the Apache2 Server; `sudo systemctl restart apache2`

On the web browser, test the load balancing connection using the public Ip address of our load balancer server.



Webserver1

```
[ec2-user@ip-172-31-43-135 ~]$ sudo tail -f /var/log/httpd/access_log
90.151.171.108 - - [17/Jul/2023:08:22:59 +0000] "CONNECT ip.bablosoft.com:443 HTTP/1.1" 302 2455 "-" "Mozilla/5.0 (Windows NT 6.1; rv:16.0) Gecko/20100101 Firefox/16.0 (+https://best-proxies.ru/faq/#from)"
90.151.171.108 - - [17/Jul/2023:08:23:09 +0000] "GET http://ip.bablosoft.com/?Z71737521220Q1 HTTP/1.1" 302 2455 "https://google.com/" "Mozilla/5.0 (Windows NT 6.1; rv:16.0) Gecko/20100101 Firefox/16.0 (+https://best-proxies.ru/faq/#from)"
172.31.44.240 - - [17/Jul/2023:08:23:20 +0000] "CONNECT / HTTP/1.1" 400 226 "-" "-"
172.31.44.240 - - [17/Jul/2023:08:23:30 +0000] "GET /?Z76854621220Q1 HTTP/1.1" 302 2455 "https://google.com/" "Mozilla/5.0 (Windows NT 6.1; rv:16.0) Gecko/20100101 Firefox/16.0 (+https://best-proxies.ru/faq/#from)"
172.31.44.240 - - [17/Jul/2023:08:27:41 +0000] "GET /.git/config HTTP/1.1" 404 196 "-" "python-requests/2.25.1"
172.31.44.240 - - [17/Jul/2023:08:32:44 +0000] "OPTIONS / HTTP/1.1" 302 2455 "-" "-"
185.254.196.173 - - [17/Jul/2023:08:33:35 +0000] "GET /.env HTTP/1.1" 404 196 "-" "Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/81.0.4044.129 Safari/537.36"
185.254.196.173 - - [17/Jul/2023:08:33:35 +0000] "POST / HTTP/1.1" 302 2455 "-" "Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/81.0.4044.129 Safari/537.36"
34.94.56.191 - - [17/Jul/2023:08:38:29 +0000] "\x16\x03\x01" 400 226 "-" "-"
34.94.56.191 - - [17/Jul/2023:08:38:33 +0000] "OPTIONS / HTTP/1.0" 302 2455 "-" "-"
102.88.63.107 - - [17/Jul/2023:08:40:09 +0000] "GET / HTTP/1.1" 200 2639 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/114.0.0.0 Safari/537.36"
102.88.63.107 - - [17/Jul/2023:08:40:09 +0000] "GET /script.js HTTP/1.1" 404 196 "http://13.48.30.155/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/114.0.0.0 Safari/537.36"
172.31.44.240 - - [17/Jul/2023:08:40:38 +0000] "GET /admin_tooling.php HTTP/1.1" 200 2396 "http://13.48.58.202/login.php" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/114.0.0.0 Safari/537.36"
102.88.62.139 - - [17/Jul/2023:08:41:00 +0000] "-" 408 - "-" "-"
172.31.44.240 - - [17/Jul/2023:08:41:26 +0000] "GET /admin_tooling.php HTTP/1.1" 200 2307 "http://13.48.58.202/login.php" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/114.0.0.0 Safari/537.36"
```

Webserver2

```
[ec2-user@ip-172-31-41-43 ~]$ sudo tail -f /var/log/httpd/access_log
172.31.44.240 - - [17/Jul/2023:08:23:20 +0000] "CONNECT / HTTP/1.1" 400 226 "-" "-"
172.31.44.240 - - [17/Jul/2023:08:23:30 +0000] "GET /?Z76854621220Q1 HTTP/1.1" 302 2455 "https://google.com/" "Mozilla/5.0 (Windows NT 6.1; rv:16.0) Gecko/20100101 Firefox/16.0 (+https://best-proxies.ru/faq/#from)"
172.31.44.240 - - [17/Jul/2023:08:27:41 +0000] "GET /.git/config HTTP/1.1" 404 196 "-" "python-requests/2.25.1"
172.31.44.240 - - [17/Jul/2023:08:32:44 +0000] "OPTIONS / HTTP/1.1" 302 2455 "-" "-"
185.254.196.173 - - [17/Jul/2023:08:33:35 +0000] "GET /.env HTTP/1.1" 404 196 "-" "Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/81.0.4044.129 Safari/537.36"
185.254.196.173 - - [17/Jul/2023:08:33:35 +0000] "POST / HTTP/1.1" 302 2455 "-" "Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/81.0.4044.129 Safari/537.36"
34.94.56.191 - - [17/Jul/2023:08:38:29 +0000] "\x16\x03\x01" 400 226 "-" "-"
34.94.56.191 - - [17/Jul/2023:08:38:33 +0000] "OPTIONS / HTTP/1.0" 302 2455 "-" "-"
102.88.63.107 - - [17/Jul/2023:08:40:09 +0000] "GET / HTTP/1.1" 200 2639 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/114.0.0.0 Safari/537.36"
102.88.63.107 - - [17/Jul/2023:08:40:09 +0000] "GET /script.js HTTP/1.1" 404 196 "http://13.48.30.155/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/114.0.0.0 Safari/537.36"
^[[0^[[172.31.44.240 - - [17/Jul/2023:08:40:38 +0000] "GET /admin_tooling.php HTTP/1.1" 200 2396 "http://13.48.58.202/login.php" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/114.0.0.0 Safari/537.36"
^[[0102.88.62.139 - - [17/Jul/2023:08:41:00 +0000] "-" 408 - "-" "-"
^[[11^[[0^[[172.31.44.240 - - [17/Jul/2023:08:41:26 +0000] "GET /admin_tooling.php HTTP/1.1" 200 2307 "http://13.48.58.202/login.php" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/114.0.0.0 Safari/537.36"
^[[0^[[1^[[0
```

Configure Local DNS Names Resolution

We can specify the private IP address of the web servers on the host files of the Load Balancer and provide a domain name for each of the web servers accordingly.

```
#Open this file on your LB server
```

```
sudo vi /etc/hosts
```

```
127.0.0.1 localhost
172.31.43.135 webserver1
172.31.41.43 webserver2
# The following lines are desirable for IPv6 capable hosts
::1 ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
ff02::3 ip6-allhosts
~
~
~
```

On the Load Balancer, open the config file and update accordingly;
`sudo vi /etc/apache2/sites-available/000-default.conf`

```
<VirtualHost *:80>
    # The ServerName directive sets the request scheme, hostname and port that
    # the server uses to identify itself. This is used when creating
    # redirection URLs. In the context of virtual hosts, the ServerName
    # specifies what hostname must appear in the request's Host: header to
    # match this virtual host. For the default virtual host (this file) this
    # value is not decisive as it is used as a last resort host regardless.
    # However, you must set it for any further virtual host explicitly.
    #ServerName www.example.com
    <Proxy "balancer://mycluster">
        BalancerMember http://webserver1:80 loadfactor=5 timeout=1
        BalancerMember http://webserver2:80 loadfactor=5 timeout=1
        ProxySet lbmethod=bytraffic
        # ProxySet lbmethod=byrequests
    </Proxy>

    ProxyPreserveHost On
    ProxyPass / balancer://mycluster/
    ProxyPassReverse / balancer://mycluster/

    ServerAdmin webmaster@localhost
    DocumentRoot /var/www/html

    # Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
    # error, crit, alert, emerg.
    # It is also possible to configure the loglevel for particular
    # modules, e.g.
    #LogLevel info ssl:warn

    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined

    # For most configuration files from conf-available/, which are
    # enabled or disabled at a global level, it is possible to
    # include a line for only one particular virtual host. For example the
    # following line enables the CGI configuration for this host only
    # after it has been globally disabled with "a2disconf".
    #Include conf-available/serve-cgi-bin.conf
</VirtualHost>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
```

- Curl your Web Servers from LB locally

```
curl http://webserver1
```

```
curl http://webserver2
```

```
ubuntu@ip-172-31-44-240:~$ curl http://webserver1
```

```
<!DOCTYPE html>
```

```
<html>
```

```
<head>
```

```
  <meta charset="utf-8">
```

```
  <meta name="viewport" content="width=device-width, initial-scale=1">
```

```
  <link rel="stylesheet" type="text/css" href="tooling_stylesheets.css">
```

```
  <script src="script.js"></script>
```

```
  <title> PROPITIX TOOLING</title>
```

```
</head>
```

```
<body>
```

```
</html>ubuntu@ip-172-31-44-240:~$ curl http://webserver2
```

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN" "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
```

```
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en">
```

```
  <head>
```

```
    <title>Test Page for the HTTP Server on Red Hat Enterprise Linux</title>
```

```
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8" />
```

```
    <style type="text/css">
```

```
      /**/</pre></div><div data-bbox="302 508 357 521" data-label="Text"><pre>      body {</pre></div><div data-bbox="361 520 541 534" data-label="Text"><pre>        background-color: #fff;</pre></div><div data-bbox="361 532 459 546" data-label="Text"><pre>        color: #000;</pre></div><div data-bbox="361 545 497 558" data-label="Text"><pre>        font-size: 1.1em;</pre></div><div data-bbox="361 557 811 571" data-label="Text"><pre>        font-family: "Red Hat Text", Helvetica, Tahoma, sans-serif;</pre></div><div data-bbox="361 569 444 582" data-label="Text"><pre>        margin: 0;</pre></div><div data-bbox="361 581 452 594" data-label="Text"><pre>        padding: 0;</pre></div><div data-bbox="242 593 490 606" data-label="Text"><pre>        border-bottom: 30px solid black;</pre></div>
```